

APPENDIX B

Application for Provisional Patent

AUTOMATIC AND ADAPTIVE POWER SUPPLY

Inventors: Ofer Goren, Tal Dayan, and Elliott Stein

CROSS-REFERENCES TO RELATED APPLICATIONS: Application No. 10/____ filed 03/01/2002 titled COUPLER WITH THREE DEGREES OF FREEDOM.

BACKGROUND FIELD OF INVENTION:

Currently, a variety of mobile and portable devices, including laptop and portable computers, mobile telephones, pagers, personal digital assistants and other electronic devices must be connected to external electrical power sources that provide electrical power to the devices themselves, or, to recharge internal batteries of such devices, namely re-chargers. Access to these power sources, typically a plug-in cable, restrict the locations and mobility of such devices.

Known to the inventor is copending application titled "CONDUCTIVE COUPLER WITH THREE DEGREES OF FREEDOM" describing a multi-contact coupling system.

What is clearly needed is a power supply control unit that controls the electrical power provided to contacts of a power supply system or a coupling system respectively.

The field of the invention is that of power supplies and re-chargers for portable and mobile devices.

Description of the preferred embodiment

In order to control power application to a multi-contact coupling system, preferably in the idle state, the contacts of the power supply are not energized. When a load is connected to the power contacts, a sensing unit in the power supply detects that load and switches the power to the contacts based on information and properties of the load. In one embodiment, the power is of a pre-defined voltage and polarity or frequency is engaged. In some cases, the power supply may sense various parameters such as operational status, identification, and power requirements from the load and perform authentication, authorization and compatibility checks and then provide power to appropriate contacts using the required voltage and polarity. In yet other cases, the power supply may be a surface with a plurality of exposed contacts and may power multiple loads, each connected to another set of contacts and each having a different voltage or character. In some cases, the apparatus will provide protection against short circuits and overloads when contacts of the power supply are connected and provide personal shock protection when touching exposed contacts when a valid load is not present. Fig 1 shows

a simplified diagrammatical overview of such a system. The power supply unit receives typically power from a standard household current supply, but in some cases may also use other sources, such as generators, solar panels, batteries, fuel cells, each separately or in any combination. On the other side, a multitude of contacts are shown as known to the inventor to exist in a Coupling System (CS). In the current art, the contacts of a power supply provide voltage in a preset voltage, frequency and polarity, independent on the actual load attached to it. In the present invention, the power supply detects when, where and how the load is connected to the power contacts, and may sense information such as identification, product type, manufacture, polarity power requirements, and other parameters and properties of the load and the connection, and uses this information to connect the power to the powered device thus, yielding several new benefits such as the ability to perform authentication and compatibility checks before providing the power, adapting the voltage and polarity to the needs of the specific load, improving safety by avoiding exposed power connectors when no load is attached and the ability to power plurality of loads at the same time, each connected to an arbitrary set of contacts and receives a different voltage. This exchange or negotiation is symbolized by the arrows at the bottom of fig 1. labeled "ID, Status, Info" for the information provided by the device, and "power" for the resulting power applied to the correct set of contacts of the CS.

Fig. 2 shows a simplified overview, where for simplicity only the connected pair of the multitude is shown. It is clear to the artisan in the field, that more contacts can be managed, by first scanning for the presence of a device using more switches, and that those may be combined or may be separate from the polarity and voltage switches. Further advanced semi-conductors may be used, rather than simple mechanical or relay type switches, as indicated here for simplicity. The voltage and the polarity of the voltage are adjusted automatically to match the needs of the load.

When the two contacts of the load are connected to the two contacts of the power supply respectively, the sensing unit of the power supply detects the unique identifier of the unit ("ID") of the load through the connections and uses this ID to determine the voltage and current requirements of the load and the polarity in which it is to be connected. If the voltage and the current requirements are in the range supported by the power supply, the sensing unit sends a signal to the switch unit to power source in the right polarity and sends a signal to the power source to set the required voltage. This sensing is done by applying a minimal, non destructive sensing voltage or pattern, and observing responses of the ID element. That ID element may be as simple as a resistor, being read with a very low voltage below the activation of the normally non-linear response of the device load. In some cases it may be a diode, or a resistor and a diode in any combination. In yet other cases, a digital ID may be used, and read, with a voltage that is below the active region of the load.

When the load is disconnected from the contacts, the sensing unit detects that the device bearing the ID is not connected to the power supply and turns off the switch unit, thereby disconnecting the power from the contacts.

Fig. 3 shows now a simplified system with multiple contacts, as shortly discussed above. It can provide power in two predefined voltage levels (V1, V2), and can power multiple devices in arbitrary combination of the two voltages requirements while automatically adapting the power polarity for each device.

The power supply contains two power sources, one of voltage V1 and one of voltage V2. When the sensing unit detects that identification unit id1 is connected between power contacts C1(+) and C3(-) and activate the switches of contacts C1 and C2 to connect C1 to the (+) side of power source V1 and connect C2 to the (-) side of power source V1. In a similar way, the load L2 is connected to the voltage source V2 in the correct polarity through power contacts C2 and C6.

The sensing unit will typically be using a micro controller and some adaptation circuitry, including resistors, diodes, capacitors and possibly active components as well. Also, not shown are the supply to the sensing unit itself. As mentioned above, the control switches may be solid state or relays etc.

CLAIMS:

1. A power provisioning system, having a power supply with two or more electrical contacts, further including in the power supply a sensing unit connected within the power supply and a control unit, also connected within the power supply, and a load, with two or more electrical contacts and an identification element, connecting to the electrical contacts of the power supply, such that, when the contacts of the load touch contacts of the power supply, the sensing unit senses that touching and instructs the control unit to provide power to some of the contacts of the Power Supply.
2. A method for power provisioning, having a power supply with two or more electrical contacts, further including in the power supply a sensing unit connected within the power supply and a control unit, also connected within the power supply, and a load, with two or more electrical contacts and an identification element, connecting to the electrical contacts of the power supply, wherein, upon the contacts of the load touch contacts of the power supply, i) the sensing unit senses that touching and ii) instructs the control unit to provide power to some of the contacts of the Power Supply.

DRAWINGS:

Figure 1:

FIGURE 1

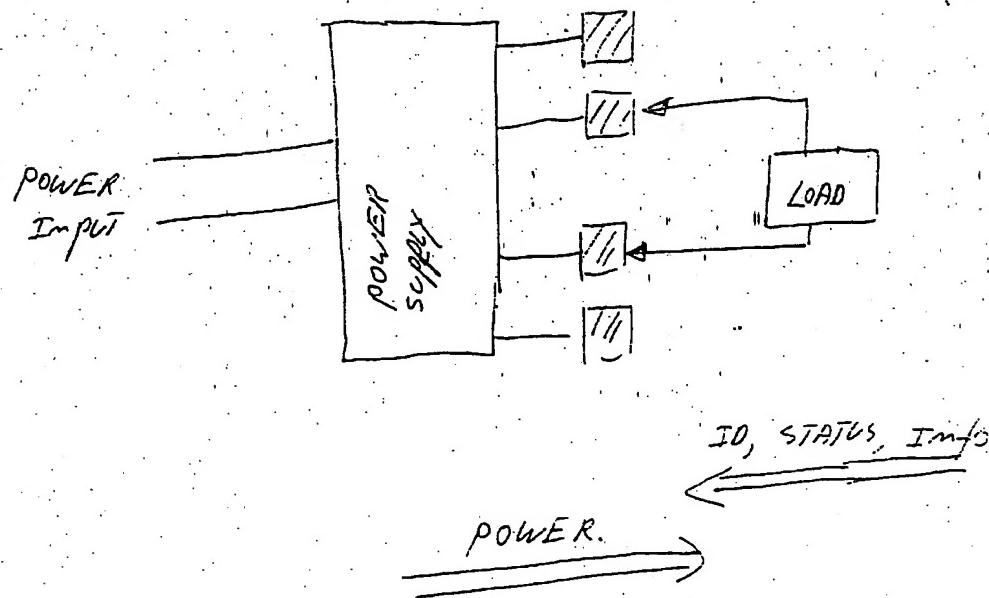


Figure 2:

FIGURE 2 - TWO CONTACT VARIABLE VOLTAGE
And POLARITY

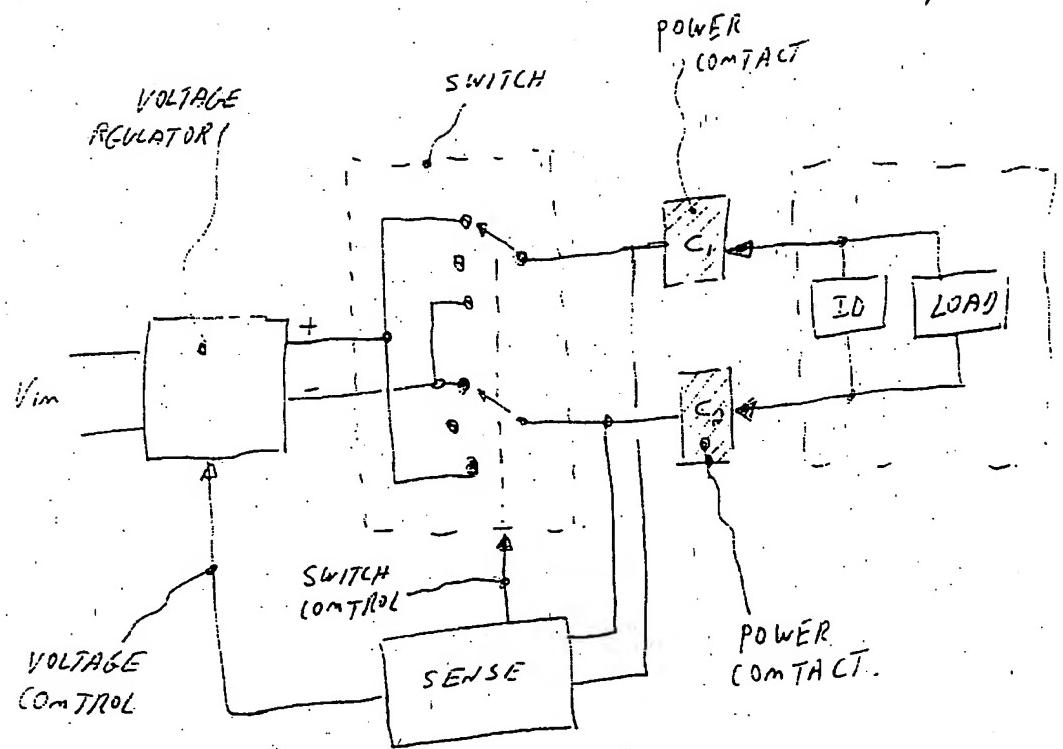


Figure 3:

FIGURE 3 - MULTI CONTACT, MULTI LOADS, MULTI VOLTAGES.

